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| 10/026,120      | 12/21/2001  | Wenjie Li            | FIS9-2001-0381-US   | 5036             |

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INTERNATIONAL BUSINESS MACHINES CORPORATION  
DEPT. 18G  
BLDG. 300-482  
2070 ROUTE 52  
HOPEWELL JUNCTION, NY 12533

EXAMINER

LEE, SIN J

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|----------|--------------|

1752

DATE MAILED: 09/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/026,120

Applicant(s)

LI ET AL.

Examiner

Sin J Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 21 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 4-7, 9-11, 13-15, and 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Hasegawa et al (US 2002/0061465 A1).

In Example 25 (see Table 1 on pg.27), Hasegawa teaches a resist composition containing Polymer 1 (which structure is shown on pg.22, [0170] and *which is calculated to have 7.6 wt.% silicon*), a photoacid generator, and a *dissolution rate inhibitor*, DRI1 (which structure is shown on pg.26, [0173] and which has *Mw of 294*), and Hasegawa teaches ([0009]) that his resist composition is suitable as a material for use in the bi-layer resist method. Hasegawa's Polymer 1 includes silicon-containing substituent group of the general formula (1) shown in [0019], and this group of formula (1) functions as an acid-eliminatable substituent group (see [0010], [0011], [0019]). Therefore, Hasegawa's Polymer 1 in Example 25 teaches the present acid-sensitive imaging polymer. Also, Hasegawa's DRI1 (*which is used as a dissolution rate inhibitor*) teaches

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present non-polymeric, silicon additive containing acid labile moieties that inhibit solubility of the composition in aqueous alkaline solutions, and it contains 17 carbon atoms. Therefore, the prior art teaches present inventions of claims 1, 2, 4-7, 9, and 10.

Hasegawa also teaches ([0095]) that pattern formation using his resist composition may be carried out by a known lithographic technique. For example (see [0095] and [0174]-[0178]), Hasegawa applies his resist composition onto an organic film such as a novolac film (present planarizing layer) which is disposed on a silicon wafer (present semiconductor material). The resist film is then exposed through a mask to deep UV rays such as KrF excimer laser of 248 nm or ArF excimer laser of 193 nm., and then post-exposure baked. Development is then carried out using an aqueous alkali solution to obtain positive patterns. Then the exposed area of the organic film is conventionally processed using oxygen plasma etching. Therefore, the prior art teaches present inventions of claims 11, 13-15, and 17-20.

### ***Claim Rejections - 35 USC § 103***

3. Claims 3, 8, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al (US 2002/0061465 A1).

With respect to present claims 3 and 16, as explained above, Hasegawa's Polymer 1 used in Example 25 includes silicon-containing substituent group of the general formula (1) shown in [0019]. For the Polymer 1, R<sup>5</sup> to R<sup>7</sup> groups in the formula (1) would all be methyl groups. Hasegawa teaches (see [0022]) equivalence of those methyl groups and fluorinated alkyl groups (such as difluoromethyl group) as R<sup>5</sup> to R<sup>7</sup>

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groups in the formula (1). Because the prior art teaches equivalence of methyl groups and fluorinated alkyl groups as  $R^5$  to  $R^7$  groups in the formula (1), it is the Examiner's position that it would have been obvious to one of ordinary skill in the art to replace at least one of those methyl groups attached to the silicon atom in the Polymer 1 with fluorinated alkyl group with a reasonable expectation of obtaining a resist composition having a high sensitivity and high resolution, especially suitable as a material for use in the bi-layer resist method. Therefore, Hasegawa's teaching would render obvious present inventions of claims 3 and 16.

With respect to present claim 8, Hasegawa teaches ([0073], [0074]) that as the dissolution rate inhibitor of his invention, a compound having on the molecule at least one carboxyl group, in which an average of 10-100 mol% of all the H atoms on the carboxyl groups are replaced with *silicon-containing groups of the formula (1)* shown in [0011], can be used. In Example 25, Hasegawa uses DRI1 as the dissolution rate inhibitor, and for DRI1,  $R^1$  and  $R^2$  in the formula (1) would be a H atom and a methyl group respectively. However, in the formula (1), Hasegawa *also teaches* (see [0012]) that  $R^1$  and  $R^2$  taken together, may form an aliphatic hydrocarbon ring in which  $-CH_2-$  may be substituted with a  $-Si(R^8)_2-$  group. *In this case, the group of the formula (1) of Hasegawa would have at least two silicon-containing moieties.* Based on Hasegawa's such teaching, it would have been obvious to one of ordinary skill in the art to use a dissolution rate inhibitor compound containing the group of the formula 1 in Hasegawa's invention in which  $R^1$  and  $R^2$  taken together forms an aliphatic hydrocarbon ring, in which  $-CH_2-$  of the ring is substituted with a  $-Si(R^8)_2-$  group, with a reasonable

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expectation of obtaining a resist composition having a high sensitivity and high resolution, especially suitable as a material for use in the bi-layer resist method.

Therefore, Hasegawa's teaching would render obvious present invention of claim 8.

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hasegawa et al (US 2002/0061465 A1) in view of Lin (5,304,453).

As explained above in Paragraph 2, in Hasegawa, the exposed area of the organic film is conventionally processed using oxygen plasma etching. Oxygen plasma etching and oxygen reactive ion etching are interchangeable etching technique used in the art for patterning planarization sublayers in two layer system as evidenced by Lin, col.2, lines 42-55. Therefore, it would have been obvious to one of ordinary skill in the art to use oxygen reactive ion etching technique in Hasegawa in order to process the organic film because oxygen plasma etching and oxygen reactive ion etching are known in the art (as evidenced by Lin) as interchangeable etching technique used in patterning planarization sublayers in two layer system. Therefore, Hasegawa in view of Lin would render obvious present invention of claim 12.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is (703) 305-0504. The examiner can normally be reached on Monday-Friday from 8:30 am EST to 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Janet Baxter, can be reached on (703) 308-2303. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9311 for after final responses or (703) 872-9310 for before final responses.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0661.

*S. Lee*

S. Lee  
9/3/03

*R. Ashton*

ROSEMARY ASHTON  
PRIMARY EXAMINER